

- ing element is configured to convey radio-frequency signals at a frequency greater than 10 GHz and comprises a first patch element, a second patch element overlapping the first patch element, and a third patch element overlapping the first and second patch elements; and
- a conductive via that extends through the dielectric substrate and couples the signal trace of the radio-frequency transmission line path to the first, second, and third patch elements.
2. The electronic device defined in claim 1, wherein the radio-frequency transmission line path comprises a differential radio-frequency transmission line path.
3. The electronic device defined in claim 2, wherein the radio-frequency transmission line path further comprises an additional signal trace on the dielectric substrate, the electronic device further comprising:
- an additional conductive via that extends through the dielectric substrate and couples the additional signal trace of the radio-frequency transmission line path to the first, second, and third patch elements.
4. The electronic device defined in claim 3, wherein the conductive via contacts the first, second, and third patch elements at first locations on the first, second, and third patch elements, and the additional conductive via contacts the first, second, and third patch elements at second locations on the first, second, and third patch elements, the second locations being laterally offset from the first locations.
5. The electronic device defined in claim 4, wherein the differential radio-frequency transmission line path comprises a first stripline that includes the signal trace and a second stripline that includes the additional signal trace.
6. The electronic device defined in claim 5, further comprising:
- radio-frequency transceiver circuitry having a differential port coupled to the first and second striplines.
7. The electronic device defined in claim 6, wherein the radio-frequency transceiver circuitry is mounted to the antenna module.
8. The electronic device defined in claim 1, wherein the first, second, and third patch elements are rectangular.
9. The electronic device defined in claim 1, wherein the second patch element completely overlaps the first patch element and the third patch element completely overlaps the first and second patch elements.
10. The electronic device defined in claim 1, wherein the antenna radiating element comprises parasitic elements formed from conductive traces coplanar with one of the first, second, and third patch elements.
11. The electronic device defined in claim 1, wherein the antenna radiating element comprises parasitic elements formed from conductive traces coplanar with two of the first, second, and third patch elements.
12. The electronic device defined in claim 1, further comprising fences of conductive vias coupled to the ground traces and extending through the dielectric substrate, wherein the fences of conductive vias laterally surround the antenna radiating element on the dielectric substrate.
13. The electronic device defined in claim 1, further comprising:
- a dielectric cover layer, wherein the dielectric substrate is mounted to the dielectric cover layer and the antenna radiating element is configured to convey the radio-frequency signals through the dielectric cover layer.
14. The electronic device defined in claim 13, wherein the dielectric cover layer comprises glass.
- 15-20. (canceled)
21. The electronic device of claim 1, wherein the conductive via comprises a first portion that couples the signal trace to the first patch element, a second portion that couples the first patch element to the second patch element, and a third portion that couples the second patch element to the third patch element.
22. The electronic device of claim 21, wherein the radio-frequency transmission line path further comprises an additional signal trace on the dielectric substrate, the electronic device further comprising:
- an additional conductive via that extends through the dielectric substrate and couples the additional signal trace of the radio-frequency transmission line path to the first, second, and third patch elements, the additional conductive via being laterally offset from the conductive via.
23. The electronic device of claim 22, wherein the additional conductive via comprises a fourth portion that couples the additional signal trace to the first patch element, a fifth portion that couples the first patch element to the second patch element, and a sixth portion that couples the second patch element to the third patch element.
24. The electronic device of claim 1, further comprising:
- an additional antenna radiating element on the dielectric substrate and overlapping the ground traces, wherein the additional antenna radiating element is configured to convey radio-frequency signals at a frequency greater than 10 GHz and comprises a fourth patch element, a fifth patch element overlapping the fourth patch element, and a sixth patch element overlapping the fourth and fifth patch elements;
- an additional radio-frequency transmission line path having an additional signal trace on the dielectric substrate; and
- an additional conductive via that extends through the dielectric substrate and couples the additional signal trace to the fourth, fifth, and sixth patch elements.
25. The electronic device of claim 24, further comprising:
- a phased antenna array that includes the antenna radiating element and the additional antenna radiating element; and
- control circuitry configured to control the phased antenna array to convey radio-frequency signals within a signal beam oriented at a selected beam pointing angle.
26. The electronic device of claim 25, further comprising:
- a fence of conductive vias extending through the dielectric substrate, the fence of conductive vias being laterally interposed between the antenna radiating element and the additional antenna radiating element.

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